Eyes on the Earth: Technology Capabilities of the Past, Present, and Future

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NASA has deployed a portfolio of missions that have exponentially expanded our ability to understand the planet. As capabilities have evolved with each subsequent generation of missions, synergies have developed through the transfer of knowledge and heritage designs. These can be traced through the interconnections between research and operational missions, and between robotic and human missions. NASA's Earth-monitoring research missions have yielded discoveries and insights that have contributed significantly to the capabilities of its operational missions. The early Nimbus missions of the 1960s, for example, led to breakthroughs in the ability to measure air pressure, paving the way for the development of sophisticated weather forecasting instruments and techniques.[ii] The relationship between research and operations is not strictly unidirectional; operations can also influence research, as was the case with the Landsat 4 Thematic Mapper, which influenced the design of the MODIS and ASTER instruments. Striking a balance between research and operational missions in the future is critical as NASA pursues the next generation of technological breakthroughs in earth monitoring. While the majority of Earth monitoring missions has relied exclusively on robotic technology, there is also a forty-year history of humans studying Earth from space. The first photograph of Earth in its entirety was taken on the Apollo 8 mission in 1968. With the advent of space-based platforms such as Skylab and the International Space Station, astronauts have had opportunities to conduct real-time research in space. As NASA and its stakeholders in government and the scientific community develop long-range plans for Earth-monitoring in the future, it will be important to maintain this balance between robotic and human missions.

Notes:

i . National Academy of Sciences, “The International Geophysical Year,” 2005. Accessed 29 May 2007 at http://www.nas.edu/history/igy

ii. http://earthobservatory.nasa.gov/Study/Nimbus/nimbus2.html